

1. Theorem: Operations with Power Series

$$\text{Let } f(x) = \sum_{n=0}^{\infty} a_n x^n \text{ and } g(x) = \sum_{n=0}^{\infty} b_n x^n.$$

$$1. f(kx) = \sum_{n=0}^{\infty} a_n k^n x^n$$

$$2. f(x^N) = \sum_{n=0}^{\infty} a_n (x^N)^n = \sum_{n=0}^{\infty} a_n x^{Nn}$$

$$3. f(x) \pm g(x) = \sum_{n=0}^{\infty} a_n x^n \pm \sum_{n=0}^{\infty} b_n x^n = \sum_{n=0}^{\infty} [a_n x^n \pm b_n x^n] = \sum_{n=0}^{\infty} (a_n \pm b_n) x^n$$

The domain of $f \pm g$ is the intersection of the domain of f and the domain of g .